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EXAMINER	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/826,524	KIMURA ET AL.	
	Examiner	Art Unit	
	Nathan Danielsen	2627	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 March 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-47* is/are pending in the application.

4a) Of the above claim(s) *5,6,8,9,23,24,29-33 and 42-47* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4,7,10-22,25-28 and 34-41* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *19 April 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *07/13/06 & 09/26/06*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. Claims 1-47 are pending. Claims 5, 6, 8, 9, 23, 24, 29-33, and 42-47 have been withdrawn in response to applicant's election filed 09 March 2007.

Election/Restrictions

2. Applicant's election of the species of figure 24 in the reply filed on 09 March 2007 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

3. Claims 5, 6, 7, 8, 23, 24, 29-33, and 42-47 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected species, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on 09 March 2007.

Priority

4. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Claim Objections

5. Claims 22, 26, 31, 33, 36, 38, 41, 45, and 47 are objected to for not ending with a period. Claims 16, 23, 24, 29, 31, and 32 are objected to under 37 CFR 1.121(c) as having the wrong status identifiers. Claim 13 is objected to because "arbitral" should be --arbitrary--. Claim 20 is objected to because "comprises at least one of a plastic lens" should be changed to --comprises at least one plastic lens-- as in claim 15. Claims 36 and 38 are objected to because of the parentheses around "wavelength 587.6 nm". Appropriate correction is required.

Claim Rejections - 35 USC § 112

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claims 1-4, 7, 10-22, 25-28, and 34-41 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

8. Claims 1 and 34 are rejected as being indefinite because it is unclear what wavelength or range of wavelengths is referred to by the limitation "a second wavelength λ2 which is 1.3 times longer than the wavelength of the first wavelength λ1" since the claimed ranges result in a ratio of 1.333 (600 nm / 450 nm) and applicant's disclosed, preferred wavelengths result in a ratio of 1.617 (655 nm / 405 nm). Further, applicant has not disclosed an embodiment where the second wavelength is approximately 527 nm (1.3 * 405 nm).

9. Claim 34 recites the limitations "the lens group" and "the spherical aberration correcting optical unit". There is insufficient antecedent basis for these limitations in the claim.

10. Claims 21 and 40 are rejected as being indefinite because, in light of the specification, it is unclear exactly what is meant by the term "one-group lens". Claims 22 and 41 are rejected as being dependent on indefinite claims.

11. Claim 36 is rejected as being indefinite because it is unclear if applicant intends to claim only one lens having chromatic aberration correcting element or more than one lens, each having a chromatic aberration correcting element.

12. Claims 2-4, 7, 10-19, 21, 22, 25-28, 34, 35, 37-39, and 41 are rejected as being dependent on an indefinite claim.

Claim Rejections - 35 USC § 102

13. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

14. Claims 1-4, 7, 10-16, 19, 20, 25-28, and 34 are rejected under 35 U.S.C. 102(b) as being anticipated by Atarashi et al (KR Patent Application Publication 2003-0030926, as cited using English equivalent US Patent Application Publication 2003/0185134; hereinafter Atarashi).

Regarding claims 1-4, 7, 19, and 34, Atarashi discloses a coupling lens for an optical pickup apparatus comprising:

a first light source for emitting a first light flux with a first wavelength λ1 of 450 nm or less (¶ 538 and element 11 in figure 44);

a second light source for emitting a second light flux with a second wavelength λ2 which is 1.3 times longer than the wavelength of the first wavelength λ1 (¶ 538 and element 12 in figure 44);

an objective lens unit to converge the first light flux emitted by the first light source onto a first information recording surface of a first optical disk and to converge the second light flux emitted by the second light source onto a second information recording surface of a second optical disk, where the second optical disk has a different recording density from that of the first optical disk (element 14 in figure 44),

wherein the coupling lens (element 20 in figure 44) is arranged between both of the first light source and the second light source and the objective lens unit, and the coupling lens is in a common optical path of the first light flux and the second light flux (figure 44),

the coupling lens comprises a chromatic aberration correcting optical element which includes a diffractive surface on at least one optical surface of the chromatic aberration correcting optical element such that a diffractive structure which is constructed by a plurality of ring-

shaped zones separated by fine steps is formed on the diffractive surface (¶ 567 and blazed portion of element 20 in figure 44);

the coupling lens is designed so that a diffraction order n2 for a diffracted ray having a largest diffraction efficiency among diffracted rays when the second light flux enters into the diffractive structure is a lower order than a diffraction order n1 for a diffracted ray having a largest diffraction efficiency among diffracted light rays when the first light flux enters into the diffractive structure (¶ 620); and

the coupling lens changes a slope angle of a marginal ray in an incident light flux to the objective lens unit by variably adjusting an interval between at least one lens group of the lens group comprising the spherical aberration correcting optical unit and the objective lens unit (¶ 544).

Regarding claim 10, Atarashi discloses where the spherical aberration correcting optical unit corrects a spherical aberration caused in the objective lens unit due to a wavelength difference between the first wavelength λ1 and the second wavelength λ2 (¶ 543).

Regarding claim 11, Atarashi discloses where the spherical aberration correcting optical unit corrects a spherical aberration caused by a variation of the first wavelength λ1 when the first wavelength λ1 varies in the range of ±10 nm (¶ 741 and 742).

Regarding claim 12, Atarashi discloses where a recording density of the first optical disk is larger than that of the second optical disk, the first optical disk includes a first protective layer on a first information recording surface thereof, and the spherical aberration correcting optical unit corrects a spherical aberration caused by a thickness error of the first protective layer (¶ 543).

Regarding claim 13, Atarashi discloses where a recording density of the first optical disk is larger than that of the second optical disk, the first optical disk includes a multi-layer structure in which optically transparent layers and information recording surfaces are alternately laminated in this order from the light source side, and the spherical aberration correcting optical unit corrects a spherical aberration which is caused when the objective lens unit makes a focus jump from an i-th information recording surface to a j-th information recording surface, where i is an arbitrary integer satisfying $1 \leq i \leq n$, j is an arbitrary integer

satisfying $1 \leq j \leq n$, j is different from i, and respective information recording surfaces in the multi-layer structure are arranged from a first information recording surface, to a second information recording surface, to an n-th information recording surface in this order from an information recording surface nearest to the light sources (¶ 769).

Regarding claim 14, Atarashi discloses where a recording density of the first optical disk is larger than that of the second optical disk, the first optical disk includes a first protective layer with a thickness of t1 on a first information recording surface, the second optical disk includes a second protective layer with a thickness of t2 ($t1<t2$) on a second information recording surface, the spherical aberration correcting optical unit corrects a spherical aberration caused by a thickness difference between a thickness of the first layer and that of the second layer (¶ 543).

Regarding claim 15, Atarashi discloses where the objective lens unit includes at least one of a plastic lens, the spherical aberration correcting optical unit corrects a refractive index variation resulting from an environmental temperature variation in the plastic lens included in the objective lens unit and/or a spherical aberration resulting from a refractive index distribution caused by a temperature distribution in the plastic lens (¶s 24, 50, and 543).

Regarding claim 16, Atarashi discloses where a recording density of the first optical disk is larger than that of the second optical disk, the first optical disk includes a first protective layer on a first information recording surface thereof (¶ 537), a first magnification and a second magnification are different from each other where the first magnification is a magnification of the objective lens unit when information recording and/or reproducing is conducted on the first optical disk and the second magnification is a magnification of the objective lens unit when information recording and/or reproducing is conducted on the second optical disk (Table 13), and the spherical aberration correcting optical unit changes an objective point position of the objective lens unit corresponding to a difference of the first magnification and the second magnification (Table 13 and ¶ 544).

Regarding claim 20, Atarashi discloses where the coupling lens comprises at least one plastic lens or a diffractive surface of the chromatic aberration correcting optical element, and the coupling lens functions to suppress a divergence angle variation in response to a temperature variation or a converging

angle variation in response to a temperature variation for the first light flux emitted from the coupling lens (¶s 24, 50, and 543).

Regarding claim 25, Atarashi discloses where the recording density of the first optical disk is larger than that of the second optical disk and wherein a numerical aperture of the objective lens unit, when information recording and/or reproducing is conducted on the first optical disk, is 0.8 or more (¶ 540).

Regarding claim 26, Atarashi discloses where the recording density of the first optical disk is larger than that of the second optical disk, a first protective layer has a thickness in the range of 0.07 mm-0.13 mm on the first information surface on the first optical disk, the second protective layer has a thickness in the range of 0.55 mm-0.65 mm on the second information surface of the second optical disk, and the optical pickup apparatus conducts recording and/or reproducing of information on the first optical disk and the second optical disk by converging the first light flux on each of the information recording surfaces of the first optical disk and the second optical disk (¶ 537).

Regarding claim 27, Atarashi discloses where the optical pickup apparatus further comprises a third light source for emitting a third light flux with a wavelength $\lambda 3$, where $730\ nm \leq \lambda 3 \leq 830\ nm$, the objective lens unit converges the third light flux onto a third information recording surface of the third optical disk and the third light flux enters into the objective lens unit without passing through the chromatic aberration correcting optical element (¶ 538 and element 13 in figure 44).

Regarding claim 28, Atarashi discloses an optical information recording and reproducing apparatus which comprises the optical pickup apparatus of claim 1 and is adapted to conduct at least one of recording information on the first and second optical disks and reproducing information recorded on the first and second optical disks (¶ 540).

Claim Rejections - 35 USC § 103

15. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

16. Claims 17, 18, 35, and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Atarashi.

Regarding claims 17 and 35, Atarashi's third embodiment (¶s 536-568) discloses everything claimed, as applied to claims 1 and 34, respectively. Additionally, Atarashi discloses where the second wavelength λ2 is in the range of 600 nm-700 nm (¶ 538). However, Atarashi's third embodiment fails to disclose the specific combination of diffraction orders.

In the same field of endeavor, Atarashi's first and second embodiments disclose where a combination of the diffraction order n1 and n2 is one of the following:

(n1, n2)=(2, 1), (3, 2), (4, 2), (5, 3), (6, 4), (7, 4), (8, 5), (10, 6) (¶s 369-393, 416, and 417 and Tables 2, 4, and 4').

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used the diffraction orders of the first and second embodiments in the design of the diffraction structure of the third embodiment, for the purpose of obtaining optimum working distances and correcting chromatic aberration (¶s 22-24).

Regarding claims 18 and 37, Atarashi's first, second, and third embodiments discloses everything claimed, as applied to claims 1 and 34, respectively. Additionally, Atarashi's third embodiment discloses where the optical pickup apparatus further comprises a third light source for emitting a third wavelength λ3 which is different from the first and second wavelengths, the objective lens unit converges a third light flux emitted from the third light source onto a third information recording surface of a third optical disk with a different recording density from those of the first and the second optical disks, the chromatic aberration correcting optical unit is arranged in a common optical path of the first to third light fluxes, the second

wavelength λ2 is in the range of 600 nm-700 nm, the third wavelength λ3 is in the range of 730 nm-830 nm (¶s 537 and 538). However, Atarashi's third embodiment fails to disclose the specific combination of diffraction orders.

In the same field of endeavor, Atarashi's first and second embodiments disclose where the chromatic aberration correcting optical unit satisfies one of the following combinations:

(n1, n2, n3)=(2, 1, 1), (4, 2, 2), (6, 4, 3) 8, 5, 4), (0.10, 6, 5)

where n1, n2 and n3 are diffraction orders of diffracted rays with largest diffraction efficiencies in the diffracted rays when the first, second and third light fluxes enter into the chromatic aberration correcting optical element respectively(¶s 369-393, 416, and 417 and Tables 2, 4, and 4').

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used the diffraction orders of the first and second embodiments in the design of the diffraction structure of the third embodiment, for the purpose of obtaining optimum working distances and correcting chromatic aberration (¶s 22-24).

17. Claims 36, 38, and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Atarashi, in view of Takeuchi et al (US Patent Application Publication 2002/0172132; hereinafter Takeuchi).

Regarding claims 36 and 38, Atarashi discloses everything claimed, as applied to claims 35 and 37, respectively. However, Atarashi's third embodiment fails to disclose the specific details of the material or physical structure of the coupling lens.

In the same field of endeavor, Atarashi's first and second embodiments disclose where a refractive index for the first wavelength λ1 of a lens constructing the chromatic aberration correcting optical element and including the diffracted surface is in the range of 1.5-1.6, Abbe number for d line (wavelength 587.6 nm) is the range of 50-60 (tables 2, 4, and 4').

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used the material of the first and second embodiments in optical system of the third embodiment, for the purpose of obtaining optimum working distances and correcting chromatic aberration

(¶s 22-24). Further, Atarashi's first and second embodiments also fail to disclose the specific depth of the steps of the diffraction structure.

In the same field of endeavor, Takeuchi discloses where the depth d0 of a step which is along an optical axis and closest to the optical axis satisfies one of the following:

(1) 1.2 μm<d0<1.7 μm

(2) 1.9 μm<d0<2.6 μm

(3) 2.6 μm<d0<3.2 μm

(4) 3.3 μm<d0<4.2 μm

(5) 4.4 μm<d0<5.0 μm

(6) 4.7 μm<d0<5.7 μm

(7) 5.6 μm<d0<6.5 μm

(8) 6.9 μm<d0<8.1 μm (¶ 47).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have designed the steps of the diffraction structure of Atarashi in the manner of Takeuchi, for the purpose of maximizing the diffraction efficiency of a k-th order diffracted light (¶ 47).

Regarding claim 39, Atarashi, in view of Takeuchi, discloses everything claimed, as applied to claim 38. Additionally, Atarashi's third embodiment discloses where the coupling lens comprises at least one of a plastic lens and a diffractive surface of the chromatic aberration correcting optical element further has a function for suppressing a divergence angle variation in response to a temperature variation or a converging angle variation in response to a temperature variation for the first light flux emitted from the coupling lens (¶s 24, 50, and 543).

Allowable Subject Matter

18. Claims 21, 22, 40, and 41 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

19. The following is a statement of reasons for the indication of allowable subject matter: the prior art of record, either alone or in combination, fails to teach or fairly suggest a coupling lens which satisfies the formulas of claims 21 and 40.

Closing Remarks/Comments

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nathan Danielsen whose telephone number is (571) 272-4248. The examiner can normally be reached on Monday-Friday, 9:00 AM - 5:00 PM Eastern Time.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, William Korzuch can be reached on (571) 272-7589. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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05/17/2007

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